

SOLUTION BRIEF

Big Data / Analytics

Financial Services, AdTech, MarTech,
Telecommunications, and More



Scale Real-Time Decision Support System Performance up to 4X

Aerospike Database* enhances responsiveness when handling massive data loads, delivering up to a 4X increase in throughput by refreshing systems that are just a few years old.¹

“Aerospike is the database of choice for real-time Systems of Engagement. The new Intel® Xeon® Scalable processors provide our customers with a fast, flexible foundation for meeting the ever-growing data demands of their digital transformation efforts—with speed, scalability, and mission-critical reliability.”

— Brian Bulkowski,
Cofounder and CTO, Aerospike

The Intel® Xeon® Scalable processors represent the most compelling platform advancement in a decade. It provides an outstanding hardware foundation for Aerospike Database*, setting the stage for your business to:

- **Provide great customer experiences** by maintaining low latency under extreme loads.
- **Scale almost without limit** as your workloads and data sets grow.
- **Protect your business** with mission-critical reliability and uptime.
- **Contain your costs** with powerful performance per server.

The cornerstone of the digital economy is the “business moment”—a critical fraction of a second that transforms data into insight and turns an opportunity into business value. Systems of Engagement (SoEs) run on real-time data and define the customer experience in that business moment. Whether detecting fraud, updating trading positions, driving hyper-personalization, or bidding for ad space, the instant a user lands on a website, an SoE needs to reliably handle Internet-scale data volumes and provide decisions at millisecond speeds without escalating costs.

Aerospike Database running on the new Intel® Xeon® Scalable processors is built to handle massive workloads and demands for responsiveness cost-effectively. It is a hybrid memory architecture database optimized for flash and solid-state drives (SSDs) and is the database of choice for real-time SoEs. This transactional analytics database has [proven its ability](#) to process terabytes of data and billions of transactions per day in mission-critical production environments.

Many of the world’s most successful Internet businesses, including ZypMedia*, Adform*, Appnexus*, BlueKai*, and Kayak*, rely on Aerospike as the ideal solution to support their critical SoEs that require low latency, high throughput, and massive scalability. Key use cases include the following:

- **Fraud prevention and digital payments applications** that analyze hundreds of contextual data points for billions of users and devices in real time to identify questionable transactions.
- **Financial services systems** that execute trades and perform real-time, analytics-based risk monitoring and alerting.
- **Real-time advertisement bidding** that uses real-time auctions to broker online ads, so the right ad can be presented to the right visitor within a fraction of a second.

Aerospike can scale up or out on any number of servers based on the Intel® Xeon® processor to address extreme latency, throughput, and data capacity requirements, providing an unprecedented combination of speed, scale, and reliability.

Aerospike also supports automatic data replication and failover across clusters, racks, and data centers to help ensure that data is reliable, consistent, and always available. By combining exceptional performance with end-to-end resilience, Aerospike provides a solid foundation for supporting any customer-facing or revenue-critical application that requires high availability.

Performance Advances to Empower Business Innovation

Cutting-edge applications and tailored user experiences require immediate access to specific, large quantities of data from anywhere in a database, even in the presence of heavy write loads. They must maintain this capability even as data sets continue to grow. To achieve this need for predictable high performance, Aerospike continually tunes and refines its database engine, while also benefiting from advances in server hardware.

Testing by Intel engineers measured performance on multiple generations of Aerospike Database and Intel® architecture. Compared to a baseline system running Aerospike 3.6.4 on a server based on the Intel® Xeon® processor E5-2697 v3, a refreshed system based on Aerospike 3.12.1 running on the Intel® Xeon® processor E5-2699 v4 showed up to a 2.8X speedup, as illustrated in Figure 1.¹

A further upgrade of the server to the latest Intel® Xeon® Platinum 8180 processor drives up that performance gain to up to 4X. Because the Intel® Xeon® processor E5 v3 product family was introduced in 2014, servers based on these processors are commonly in use, putting these performance increases within reach of many enterprises using Aerospike Database.

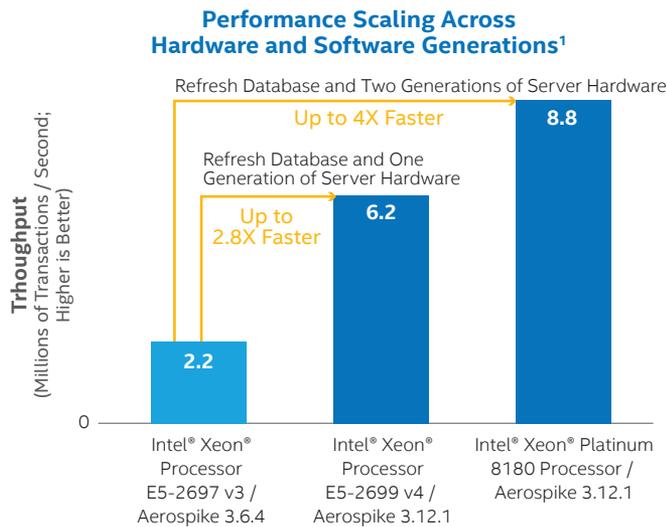


Figure 1. Ongoing improvements to Aerospike software and Intel® architecture deliver substantial performance gains with each new generation of the database and of Intel® Xeon® processors.¹

A Database Built for Real-Time Systems of Engagement

Business competitiveness depends on creating real-time opportunities from massive (and growing) data sets, where latency requirements continue to become stricter with every passing year. Insights must be generated in just microseconds, and SoEs must make analysis and action happen at the same moment. Vital data that is generated through interactions with customers, partners, and ecosystems must be the basis for instantaneous activity, providing continuous feedback that informs every action.

Aerospike is a Hybrid Memory Architecture database that gives businesses the basis for SoEs that meet these challenges, by converging their operational and analytical systems. An innovative set of features and capabilities enables the combination of high throughput and low latency that brings together historic and real-time data, driving value from every business moment.

- **Hybrid memory architecture** holds the database index in memory and uses attached SSDs as block devices to store data. Access to the index without disk I/O enables predictable high performance.

- **Real-time engine** uses multi-threaded processes to provide simultaneous access to the data across all available cores to scale up to millions of transactions per second at sub-millisecond latencies per node.
- **Aerospike's Smart Client*** automatically distributes both data and traffic to all the nodes in a cluster. Automatic load balancing of the client improves both performance and correctness.

Ongoing enhancements to Aerospike's architecture continue to take greater advantage of the performance potential of Intel architecture. For example, recent developments have included "auto-tuning" capabilities that automatically bind processes and network interrupts to specific processor cores. This parallelism efficiency is particularly valuable as the core counts for Intel Xeon processors continue to rise. In addition to predictable high performance, Aerospike customers benefit from high availability and uptime, low total cost of ownership, and superior scalability.

"Zypmedia revolutionizes local advertising using AI and High Frequency trading technology. To drive relevant ad placements for our advertisers we need a low latency, scalable DB that can support 10 billion ad calls/day with an SLA of <100ms. Aerospike's continuous innovations have evolved into a top-notch, fast, reliable and cost effective database service, supporting us to scale and innovate our own offering that delights our clients."

– Ramandeep Ahuja, Co-Founder and CTO, ZypMedia

Processor Innovation to Power Growing Businesses

Servers that employ the advances built into the Intel Xeon Scalable processors provide an excellent foundation for business with Aerospike Database. A new microarchitecture based on 14-nanometer process technology provides significant per-core advances, including a new lower-latency L1/L2 cache hierarchy that directly benefits data-intensive, latency-sensitive Aerospike workloads. Increased hardware parallelism of up to 28 cores per socket complements the inherent benefit of enhanced core affinity that is built into the latest version of Aerospike Database.

A redesigned memory subsystem with six memory channels delivers a 50 percent increase in memory bandwidth compared to the four channels in the previous generation of the Intel Xeon processor. Support for up to 24 DIMMs of DDR4-2667 RAM provides database servers the ability to scale up system memory to aid in the handling of very large data sets.

“The dramatic performance increases we see in Aerospike Database* over the past few processor generations, and especially with the new Intel® Xeon® processor Scalable family, are an excellent showcase for the business advantages being driven by Intel and the enterprise software ecosystem.”

– Ramesh Arakere, Software Engineering Manager, Intel

Together, these improvements offer a compelling foundation for the predictable performance that customers of Aerospike Database depend on. Upgrading servers to this new processor platform positions businesses for immediate benefits and continues to provide advantages as they scale their enterprises in the years to come.

Conclusion

Refreshing the Aerospike platform and the servers it runs on gives customers a straightforward way to dramatically increase predictable performance. The advances built into that refresh enable businesses to readily serve more customers and deliver a better user experience.

Software enhancements in the latest version of Aerospike Database seamlessly take advantage of the benefits of the Intel Xeon Scalable processors such as more robust cores and higher memory bandwidth, with minimal effort on the part of customers. By upgrading these systems, businesses are prepared to embrace burgeoning data volumes with all the intelligence that modernized applications can muster, preparing real-time SoEs with the means to shine with the emergence of critical business moments.

Learn more about Aerospike:
www.aerospike.com

Learn more about the
Intel Xeon Scalable Processors:
www.intel.com/XeonScalable

Solution provided by:



¹ **BASELINE:** Aerospike Server Enterprise* 3.6.4, CentOS* 6.7, kernel version 2.6.32-573.3.1.el6.x86_64, 2 Intel® Xeon® processor E5-2697 v3, 128 GB DDR4-1866, regular DIMM, 2x 10 Gb network Intel® Ethernet Controller X540-AT2 not bonded, no disk used – in memory workload.

NEXT-GENERATION: Aerospike Server Enterprise 3.12.1, CentOS 7.2 with kernel updated to 4.4.59, Intel® Xeon® processor E5-2699 v4, Intel® Turbo Boost Technology and Intel® Hyper-Threading Technology enabled, BIOS SE5C610.86B.01.01.0016.033120161139, 128 GB DDR4-1866, 2x Intel® 82599ES 10 Gigabit Ethernet Controllers (all four ports on the two network controllers were bonded for an aggregate 40,000 Mb/s bond). No storage – in-memory workload.

NEW: Aerospike Server Enterprise 3.12.1, CentOS 7.2 with kernel updated to 4.4.59, Intel® Xeon® Platinum 8180 processor, Intel Turbo Boost Technology and Intel Hyper-Threading Technology enabled, BIOS SE5C620.86B.01.00.0412.020920172159, 384 GB DDR4-2666, 2x Intel 82599ES 10 Gigabit Ethernet Controllers (all four ports on the two network controllers were bonded for an aggregate 40,000 Mb/s bond). No storage – in-memory workload.

BASELINE CLIENTS: Eight client systems were used to concurrently submit queries to the servers and drive the workload. The clients were configured as follows: Intel Xeon processor E5-2697 v3, 128 GB of memory, and 10 Gb Intel Ethernet Controller X540-AT2 network.

NEXT-GENERATION and NEW CLIENTS: Eight client systems were used to concurrently submit queries to the servers and drive the workload. The clients were configured as follows: CentOS 7.2 with kernel 3.10.0-327, Intel® Xeon® processor E5-2697 v4, Intel Turbo Boost Technology and Intel Hyper-Threading Technology enabled, BIOS SE5C610.86B.01.01.0016.033120161139, 128 GB RAM, 1x Intel 82599ES 10 Gigabit Ethernet Controller.

For the BASELINE system, the database was populated with 200 M records of 100 bytes each and benchmarked with the Aerospike Java® Benchmark tool (<https://github.com/aerospike/aerospike-client-java>). The workload simulated a 95 percent/5 percent read/update ratio. Two Aerospike instances were launched on a single server forming a cluster. Each Aerospike instance was affinitized to a CPU socket and configured to use one of the 10 GB NICs. Each 10 GB NIC had its interrupt IRQs affinitized to a CPU socket.

For the NEXT-GENERATION and NEW systems, the database was populated with 400 M records of 100 bytes each and benchmarked with the Aerospike Java Benchmark tool (<https://github.com/aerospike/aerospike-client-java>). The workload simulated a 95 percent/5 percent read/update ratio. Two Aerospike instances were launched on a single server forming a cluster.

Tests document performance of components on a particular test, in specific systems. Differences in hardware, software, or configuration will affect actual performance. Consult other sources of information to evaluate performance as you consider your purchase. For more complete information about performance and benchmark results, visit <http://www.intel.com/performance>.

Cost reduction scenarios described are intended as examples of how a given Intel-based product, in the specified circumstances and configurations, may affect future costs and provide cost savings. Circumstances will vary. Intel does not guarantee any costs or cost reduction.

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